

**REMARKS****Summary of the Office Action**

Claims 1 and 7 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly being non-enabled.

Claims 1, 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,875,164 to Yamakawa et al. ("Yamakawa") in view of U.S. Patent No. 6,041,031 to Ichimura et al. ("Ichimura"), and further in view of European Patent Application No. 0 814 465 ("EP '465").

Claims 1, 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,031,792 to Nakano et al. ("Nakano") in view of either Narahara et al. ("Narahara") or Ichimura, and further in view of EP '465.

**Summary of the Response to the Office Action**

Applicants have amended claim 1.

Claims 1, 7 and 8 are pending.

**All Claims Define Allowable Subject Matter**

Claims 1 and 7 are rejected under 35 U.S.C. § 112, first paragraph, as allegedly being non-enabled. Applicants respectfully traverse the rejection under 35 U.S.C. § 112, first paragraph. Applicants have amended claim 1 to particularly point out and distinctly claim an embodiment of Applicants' invention. Claim 1 recites a pickup device of an apparatus for recording or reproducing information to and from a multi-layered recording medium having a

plurality of recording layers laminated through spacer layers. Each of the spacer layers of the multi-layered recording medium has a thickness of 10  $\mu\text{m}$  to 30  $\mu\text{m}$ . Support for claim 1 is provided at, for example, page 15, lines 15-17 of Applicants' specification as originally filed. Each of the spacer layers of the multi-layered recording medium having a thickness of 10  $\mu\text{m}$  to 30  $\mu\text{m}$  provides an advantageous effect of suppressing an increase in spherical aberration. The embodiment of Applicants' invention recited in claim 1 includes an objective lens having a high numerical aperture NA of 0.85 or greater in order to record and reproduce information to and from a high density multi-layered recording medium. Generally, the greater the NA in a pickup, the greater the increase in spherical aberration. To suppress the increase in spherical aberration, the thickness of each spacer layer between adjacent recording layers may be reduced. However, the reduction of the spacer layer thickness causes an increase in interlayer crosstalk of reproduced signals, resulting in deterioration of reproduced signals. *See* page 2, line 6 - page 3, line 2 of Applicants' specification in this regard. Thus, Applicants have achieved an increase in recording density and an improved quality of reproduced signals by setting NA = 0.85 or greater, and the spacer layer's thickness to a range from 10  $\mu\text{m}$  to 30  $\mu\text{m}$ , and having the normalized detector size set to 50  $\mu\text{m}^2$  or lower in order to suppress interlayer crosstalk while maintaining the quality of reproduced signals in the pickup device.

As described at page 15, lines 1-3 of Applicants' specification, in an experiment for DVR two-layered discs, when the distortion amount is 2% - 3% or greater, the deterioration of error rate is increased. The upper limit of 50  $\mu\text{m}^2$  of the normalized detector size suppresses the distortion at 3% or lower in a reproduced signal. The upper limit of 50  $\mu\text{m}^2$  is defined on the basis of a value of 3.5 % of an interlayer crosstalk Ct for the normalized detector size, as shown

in Fig. 9 of Applicants' specification. Accordingly, the photodetector having a light-receiving part with a sufficiently small area makes data reading possible without affecting another layer.

The lower limit of the detector size is introduced for another reason, *i.e.* a reason independent of the upper limit. The lower limit of the detector size is given a value so that the capture range is not extremely small, *e.g.*  $10\ \mu\text{m}^2$  on the basis of a capture range  $1\ \mu\text{m}^2$ , as illustrated in Fig. 10 and described at page 15, lines 6-8 of Applicants' specification.

Therefore, fundamentally the lower limit of the detector size is unnecessary for the size range of  $50\ \mu\text{m}^2$  or lower. Thus, Applicants respectfully submit that claims 1 and 7 are fully enabled with regard to the feature a normalized detector size ( $B/\beta^2$ ) of a size of  $50\ \mu\text{m}^2$  or lower.

In sum, M.P.E.P. § 2164.08 states that "The determination of the propriety of a rejection based upon the scope of a claim relative to the scope of the enablement involves two stages of inquiry. The first is to determine how broad the claim is with respect to the disclosure. The entire claim must be considered. The second inquiry is to determine if one skilled in the art is enabled to make of use the entire scope of the claimed invention without undue experimentation.

Applying this test to the present facts, the text inquiry confirms that the specification describes a normalized detector size of  $10\ \mu\text{m}^2$  to  $50\ \mu\text{m}^2$ , whereas claim 1 does not recite the lower limit (*i.e.*, it more broadly recites a size of  $50\ \mu\text{m}^2$  or lower). As for the second inquiry, Applicants submit that one skilled in the art would most clearly be enabled to make and use a detector having a size of  $50\ \mu\text{m}^2$  or lower because, for the reasons discussed in detail above, the lower limit of the detector size is independent of the upper limit and is unnecessary for the size range of  $50\ \mu\text{m}^2$ . Thus, under the test provided in M.P.E.P. § 2164.08, Applicants respectfully

submit that the current recitation in claim 1 is fully enabled and respectfully request that the rejection under 35 U.S.C. § 112, first paragraph, of claims 1 and 7, be withdrawn.

Claims 1, 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Yamakawa in view of Ichimura, and further in view of EP '465. Claims 1, 7 and 8 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakano in view of either Narahara or Ichimura, and further in view of EP '465. Applicants respectfully traverse the rejections under 35 U.S.C. § 103(a).

Yamakawa discloses an apparatus for recording information on, or reproducing information from, different types of recording mediums, *e.g.* CD and DVD. Yamakawa does not show any multi-layered recording medium having a plurality of recording layers laminated through spacer layers, nor any apparatus for recording and reproducing for the same. As illustrated in Fig. 6, Yamakawa merely discloses a DVD 20 that is symmetrical with respect to a median plane thereof, in a double-sided structure which includes a first disc member having a substrate 21, an information recording layer 22 disposed on the substrate 21, and a protective film 23 disposed on the information recording layer 22, and a second disc member having a substrate 31, an information recording layer 32 disposed on the substrate 31, and a protective film 33 disposed on the information recording layer 32, such that the first and second disc members are bonded to each other through the protective films 23, 33. The thickness of each substrate of DVD 20 is increased by 0.1 mm from 0.6 mm (the thickness of the substrates 21, 31 of the DVD 20) to 0.7 mm. Yamakawa does not teach or suggest the feature of each of the spacer layers of the multi-layered recording medium has a thickness of 10  $\mu$ m to 30  $\mu$ m, as recited in claim 1.

Moreover, Applicants submit that the instant embodiment of Applicants' invention (whereby  $NA=0.85$  or more) includes the feature that the normalized photodetector size is in the range from  $50\text{ }\mu\text{m}^2$  or lower, which is narrower than Yamakawa's teachings. Although a portion of the Yamakawa's normalized photodetector size overlaps the claimed values, the normalized detector size should not be compared to the different conditions of a pickup device having an objective lens of a numerical aperture of  $0.85$  or greater, and a compatible pickup device with CD-DVD of a lower numerical aperture of  $0.45$  or  $0.6$ . Yamakawa therefore fails to teach or suggest that the photodetector has a normalized detector size of  $50\text{ }\mu\text{m}^2$  or lower for the pickup device having an objective lens of a numerical aperture of  $0.85$  or greater for a multi-layered recording medium with a preferable spacer's thickness range, as claimed. Applicants note that the critical value of the upper limit  $50\text{ }\mu\text{m}^2$  is important for noise reduction in a pickup device with an object lens with a high numerical aperture e.g.,  $NA = 0.85$  or greater in order to stably write and read data to and from multi-layered recording layers. The critical value of the upper limit  $50\text{ }\mu\text{m}^2$  has been discovered by the inventors of the present application.

As illustrated in Fig. 1, Nakano merely discloses a DVD 20 that is symmetrical with respect to a median plane thereof, in a double-sided structure which includes a first disc member having a substrate 21, an information recording layer 22 disposed on the substrate 21, and a protective film 23 disposed on the information recording layer 22, and a second disc member having a substrate 31, an information recording layer 32 disposed on the substrate 31, and a protective film 33 disposed on the information recording layer 32, such that the first and second disc members are bonded to each other through the protective films 23, 33. The thickness of the substrates 21 and 31 of the DVD 20 are  $0.6\text{ mm}$ , while the thickness of the substrate 11 of the

CD 10 is 1.2 mm. Nakano does not teach or suggest the feature of each of the spacer layers of the multi-layered recording medium has a thickness of 10  $\mu\text{m}$  to 30  $\mu\text{m}$ , as recited in claim 1. Moreover, Nakano does not show a numerical aperture of 0.85 for an objective lens of a pickup device.

Ichimura discloses an optical head unit having a combination lens including an objective lens and a forward lens having a total numerical aperture of 0.8 or above (*See Abstract of Ichimura*). However, Ichimura does not teach or suggest any normalized detector size of the photodetector, or any multi-layered recording medium having a spacer's thickness range of 10  $\mu\text{m}$  to 30  $\mu\text{m}$ .

EP '465 describes the impact of having a multi-layered disc and the crosstalk between layers. EP '465 discloses equations known to those of ordinary skill in the art relating the cross talk with various parameters, as shown and described at pages 4-8 of EP '465. However, EP '465 does not teach or suggest any normalized detector size of the photodetector, or any multi-layered recording medium having a spacer's thickness range of 10  $\mu\text{m}$  to 30  $\mu\text{m}$ .

Narahara discloses an optical disc system for digital video recording using a phase change disc with 9.2 GB capacity, with the use of a red laser and an objective lens with a numerical aperture of 0.85, in combination with a thin cover layer (*See Introduction of Narahara*). However, Narahara does not teach or suggest any normalized detector size of the photodetector for a multi-layered recording medium with a preferable spacer's thickness range.

Consequently, the applied references do not teach or suggest at least the features of a pickup device of an apparatus for recording or reproducing information to and from a multi-layered recording medium including spacer layers each having a thickness of 10  $\mu\text{m}$  to 30  $\mu\text{m}$ , a

photodetector having a normalized detector size of  $50\text{ }\mu\text{m}^2$  or lower, and an objective lens having a numerical aperture of 0.85 or greater, as recited in claim 1. Claims 7 and 8 depend from claim 1, and recite the same combination of allowable features recited in claim 1, as well as additional features that define over the prior art. Accordingly, it is requested that the rejections under 35 U.S.C. § 103(a), of claims 1, 7 and 8, be withdrawn and the claims allowed.

**CONCLUSION**

In view of the foregoing, Applicants submit that the pending claims are in condition for allowance, and respectfully request reconsideration and timely allowance of the pending claims. Should the Examiner feel that there are any issues outstanding after consideration of this response, the Examiner is invited to contact Applicants' undersigned representative to expedite prosecution. A favorable action is awaited.

**EXCEPT** for issue fees payable under 37 C.F.R. § 1.18, the Commissioner is hereby authorized by this paper to charge any additional fees during the entire pendency of this application including fees due under 37 C.F.R. § 1.16 and 1.17 which may be required, including any required extension of time fees, or credit any overpayment to Deposit Account No. 50-0573. This paragraph is intended to be a **CONSTRUCTIVE PETITION FOR EXTENSION OF TIME** in accordance with 37 C.F.R. § 1.136(a)(3).

Respectfully submitted,

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